

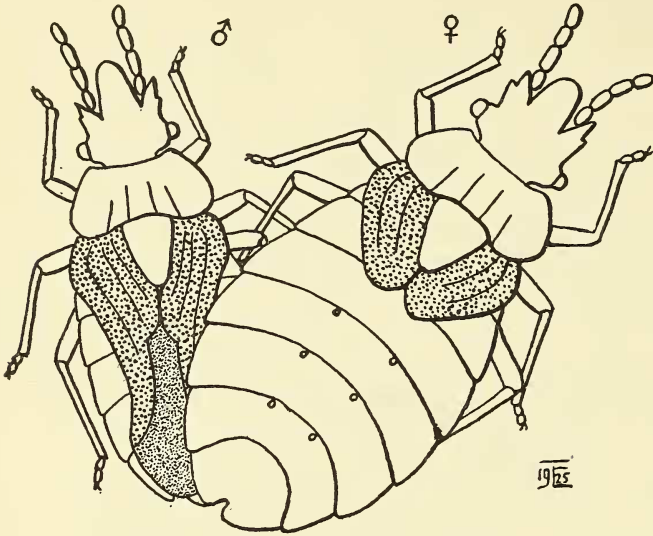
**A BIOLOGICAL NOTE ON THE PTERYGOPOLY-
MORPHISM OF ARADUS.**

(Hemiptera, Aradidae.)

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It is a well-known phenomenon that among the species of *Aradus* frequently occurs the pterygopolymorphism. As already shown by Parshley (1921), there are two ways of the reduction of hemielytra in *Aradus*, i.e., (1) by abbreviation of the hemielytra, or true brachyptery, and (2) by extreme attenuation without loss in length, or stenoptery. He gave a table of seven North American species of the genus, in which the pterygopolymorphism occurs, and pointed out an interesting fact "that stenoptery is found only in male individuals, while brachyptery is, with one exception, confined to females, suggesting that the phenomenon is connected with hereditary processes of a Mendelian nature." The brachyptery and aptery are also commonly met with among various families of Hemiptera-Heteroptera, and especially well distributed among the species of the Gerridae and Veliidae. Reuter (1875) and Kirkaldy (1899) supposed that the phenomenon was worked out by the course of natural selection. In either case, it is quite sure that the apterous or brachypterous form is a secondary form, but not primitive as supposed in the case of *Halobates* by B. White (1883), and in most cases, it is presumably an adaptation to the life-habits of the insects. For example, in the Gerridae, it may be an adaptation to the life on water, where the use of wings may be less important than in other habitats. Also an interesting fact discovered by Torre-Bueno (1908), that the macropterous water-striders of the *Halobates-Metrocoris* group of the Gerridae, in which most of the species are normally apterous and rarely macropterous, break off the apex of hemielytra with the legs of the insects themselves to facilitate the copulation, is highly suggestive that the aptery in this case may be an adaptation for this purpose. Fallén (1806) also supposed that the brachypterous form of a homopteron "*Delphax dispar*" Fallén [= *Liburnia pellucida* (Fabricius)] is of an adaptive significance for the same purpose.

In the case of *Aradus*, the brachyptery may be an adaptation to the life under bark of trees, as it is well-developed in the spe-



cies inhabiting such places, as *Aradus cinnamomeus* Panzer, and, in fact, I have never seen a brachyterous specimen of the species which is known to inhabit fungi.

On the other hand, however, the stenoptery, which is known only among the males of some species, seems, according to the author's observation, to be of a quite different biological significance from that of the brachyptery. It may be connected with the curious habit of copulation of the insects.

It is already known, that the bugs of the genus *Aradus* copulate in a quite different way from any other Hemipteron, *i.e.*, the male puts himself on the left side of his mate and fits the copulatory organs, which are found on the dorsal surface of the genital segments, to hers from the underside of female. Thus, both the insects take a position like the letter "V." In this case, the male always turns his abdomen a little to the right from the axis of the body in order to fit the copulatory organs. I have observed many cases in seven species: *i.e.*, *Aradus depressus* (Fabricius), *A. consentaneus* Horváth, *A. cinnamomeus* Panzer, *A. melas* Jakovlev, *A. corticalis* (Linné), *A. betulae* (Linné), and *A. lugubris* Fallén, but have never seen a case in which the male put himself on the right side of the female, and it may presumably depend on the asymmetry of the copulatory organs of the male,

whose structures are at present almost unknown in details. Strawinski (1925) gave a photograph of a mating pair of *Aradus cinnamomeus* Panzer. It is quite clear that the stenoptery is much more adaptive for this habit of copulation than the macroptery, as recognizable in the figure, and in other cases, in which males have macropterous hemielytra, the wings of the male are put between the abdomen and wings of the female, or on the wings of the female and sometimes it is observable that the wings of both the individuals are getting caught to each other.

The occurrence of the pterygopolymorphism is, with a high degree of probability, connected with the hereditary process, as suggested by Parshley, but not with the physical conditions influencing development of the insects, as in the case in some *Gerris*-species as already reported by Poisson (1921).

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